

## **REMARKS/ARGUMENTS**

Claims 1-46 and 73-81 are pending in this application. Nos. 14, 15, 19, 20, 39-42, 45, 46 and 76 are withdrawn by the Examiner from further consideration in this application as being directed to a non-elected invention. Nos. 1-13, 16-18, 21-38, 43, 44, 73-75 and 77-81 are presently under examination. These examined claims are all, once again, rejected under 35 U.S.C. 103. Reconsideration of the claim rejections on the basis of the remarks provided herein is respectfully requested.

### **Rejection Under 35 U.S.C. §103**

The Examiner continues to maintain the rejection under 35 U.S.C. §103 of claims 1-13, 16-18, 21-38, 43-44, 73-75 and 77-81 over Biella et al. (Journal of Catalysis) in view of USP 4,985,553 to Fuentes et al. and Biella et al. (Catalysis Today). The rejection is respectfully traversed.

Before discussing the prior art, however, applicants wish to respond to the Examiner's objections to the §1.132 declaration of Dr. Haji-Begli filed with the response dated June 25, 2009. At pp. 5-6 of the Action, under the heading "Response to Arguments" the Examiner argues that the claims are broader than the catalyst examples that have been provided by the applicants since the examples were not limited by temperature, pressure, pH or the concentration of the gold. Furthermore, she argues that the particle size in the examples provided by Dr. Haji-Begli relating to (a) 0.3% Au/Al<sub>2</sub>O<sub>3</sub> and (b) 1.0% Au/Al<sub>2</sub>O<sub>3</sub> is lacking.

In response to the latter issue, applicants respectfully submit for the Examiner's information that the nano-dispersed gold particles used in the catalysts according to Dr. Haji-Begli's declaration had a diameter of less than 20 nm as recited in applicants' claims presently under examination. Furthermore, as to the Examiner's point, noted above, with regard to the lack of information as to temperature, pressure, pH and gold concentration used in carrying out applicants' examples, applicants submit that they are willing, if necessary, to provide further experimental evidence including the elements noted by the Examiner. However, they believe that the non-obviousness of the presently claimed method over the cited prior art can be and, in fact, is established by the remarks previously provided taken in conjunction with those provided herein concerning such prior art.

The features of the presently claimed method which, in applicants' view, are believed to distinguish the same from the combination of references cited by the Examiner as a basis for rejecting the claims, are extensively discussed in applicants' Responses dated February 15, 2009 and June 25, 2009 to the prior Office Actions issued in this case. Those remarks are expressly incorporated by reference into this response as well.

According to the Office Action, it would be obvious to one having an ordinary level of skill in this field to replace the carbon support taught by Biella et al. with a metal oxide support because both supports are known from the prior art as alternatives for one another. The Office Action additionally argues that the examples and preferred embodiments provided in the cited references do not constitute a "teaching away" from a broader disclosure, or the use of non-preferred embodiments. Applicants, however, respectfully disagree with the Examiner's conclusion that the presently claimed method is obvious over the cited combination of references for the (additional) reasons submitted below.

Applicants, who are ones having at least an ordinary level of skill in this field of art, submit for the Examiner's information that the state of the art in this field at the time the presently claimed method was developed evinced a very strong prejudice against the use of metal oxide, instead of carbon, as a support for gold catalysts. As proof of such prejudice against the use of metal oxide supports, applicants are providing with this response copies of two sections (i.e., §9.2 entitled, "Oxidation of Alcohols and Aldehydes on Metal Catalysts" and §9.3 entitled, "Oxidation of Carbohydrates on Metal Catalysts") from the text, Fine Chemicals Through Heterogeneous Catalysis, eds. R.A. Sheldon and H.v. Bekkum, Wiley-VCH 2001). The text which these sections are taken from is a review that describes the work of leading research groups in the field of catalysis chemistry just prior to the development of applicants' presently claimed method.

The authors of the cited sections teach that, "Carbon supports (activated carbon and graphite) have the advantage of high stability under all reaction conditions, particularly at low pH and in the presence of complexing molecules." (i.e., such as carbohydrate acids). See, e.g., p. 496, lines 29-32. The above statement is confirmed by a further passage at p. 516, lines 1-2 which states that, "Carbon supports are particularly recommended because of their stability in acidic and chelating media."

At p. 497 (in §9.2.3.1) the reference discusses, in particular, the oxidation of glyoxal to glyoxylic acid. The reference teaches therein that by using Pt supported on carbon, the selectivity and conversion achieved is much higher than when one uses Pt supported on TiO<sub>2</sub> or SiO<sub>2</sub>. In fact, the platinum catalysts on metal oxide supports are almost inactive in the oxidation of glyoxal aqueous solution due to the fact that glyoxal oligomeric species, just as in the case of carbohydrate acids, form an immobile layer that is hydrogen bonded to the hydroxyl groups on the oxide surface. Applicants submit, therefore, that the diminished results demonstrated in the review article with the use of platinum supported on metal oxide, as compared to that which is achieved with catalysts constituted of platinum supported on carbon, clearly is a teaching away from the use of metal oxide supported catalysts.

The above-cited references are listed on the form appended to this response. The Examiner is respectfully requested to make the references of record in this application by initialing and dating the form and returning it to applicants' representative with the next Office communication concerning this case. A fee of \$180.00 is believed to be due with this submission. A credit card payment of the required fee for the disclosure and consideration of the cited references is being made via *EFS - Web*

In light of the evidence referred to above, therefore, applicants respectfully submit that it would not be obvious, in light of the cited combination of references, for one having an ordinary level of skill in the relevant art at the time the present application was filed, to substitute metal oxide supported catalysts for the carbon supported catalysts taught as being the most efficient by Biella et al., for the purpose of oxidizing sugars. As demonstrated above, the art in this field demonstrated, at the time before the filing of the present application, a strong prejudice against the use of metal oxide supported catalysts which, in applicants' view, would have led one of ordinary skill in this art to use carbon supported gold catalysts, instead of metal oxide supported catalysts, in the oxidation of sugars. That is, metal oxide supported catalysts were felt to have less stability than carbon supported catalysts, which would have led one of ordinary skill in this art away from, and not toward, the use of such metal oxide supported catalysts.

It is not a case, as suggested by the Examiner, where the prior art finds metal oxide supported catalysts to be simply less desirable. Rather, there is evidenced by the prior art a distinct prejudice away from the use of metal oxide supported catalysts for oxidizing sugars, which applicants are characterizing herein as a "teaching away" from such a use. Thus, the

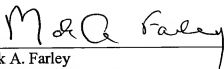
technical problem underlying the presently claimed method, i.e., to provide an improved method for the C1 selective oxidation of carbohydrates, is unexpectedly solved due to the higher stability of the metal oxide supported gold catalysts used according to the method recited in applicants' claims presently under examination in this case.

For the reasons set forth above, the Examiner is respectfully requested to reconsider and withdraw the rejection of applicants' claims under 35 U.S.C. 103.

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SUBMITTED ELECTRONICALLY  
THROUGH THE PATENT AND  
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MAF:stb

Respectfully submitted,



Mark A. Farley  
Registration No.: 33,170  
OSTROLENK FABER LLP  
1180 Avenue of the Americas  
New York, New York 10036-8403  
Telephone: (212) 382-0700